

# "But Which way is North?"

**STANDARD: 3200 - 02** Students will compare and contrast the structure of Earth's crust and interior.

**Objective: 3200-0202** Analyze current and past ideas about the structure of Earth.

Analyze evidence showing the presence of Earth's magnetic field and how it has changed over time.

## Intended Learning Outcomes:

**Use Basic Science Process Skills:** Make observations and measurements

## Background:

The particles in iron in magma and lava align themselves with the north and south pole magnetism. As they cool off, the particles remain oriented to the north and south poles. As the magma or lava cools off, the magnetism is preserved in the rocks. The following activity helps students understand lines of magnetic reversal.

**Introduction:** Review how to use a compass. Review why the compass works. Review the need to keep the compass away from the magnets during use in the lab today

**Materials:** for each group of at least three students

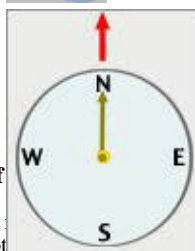
- A sheet of paper
- iron filings
- two bar magnet



- goggles



- a compass



## Procedure: Animation of

1. Place two magnets, one with north end pointing away from you and one with south end pointing away from you with the magnets about two inches apart. (Both magnets should be oriented in the same direction.)
2. Lay a sheet of paper, oriented in landscape, over the magnets. Sprinkle iron filings over the magnets. It should be enough iron filings to show the magnetic fields around the magnets.
3. Carefully lift the paper away from the magnets so as to not disturb the two magnetic fields. Another person in the group needs to move the magnets out from the center another three inches and turn them clockwise 180 degrees. Lay the paper back down on the magnets.
4. Sprinkle iron filings over the magnets. It should be enough iron filings to show the magnetic fields around the magnets.
5. Repeat steps three and four at least one more times.
6. Remove the paper from the magnets without disturbing the iron filings on the paper.
7. Set the magnets aside, so they are not in contact with the iron filings or the compass.
8. Holding the compass about an inch above the paper and starting on the left of the paper, move the compass across the paper, slowly. Observe what happens to the compass. Record the compass direction for each of the magnetic fields across the paper.

## Safety Concerns:

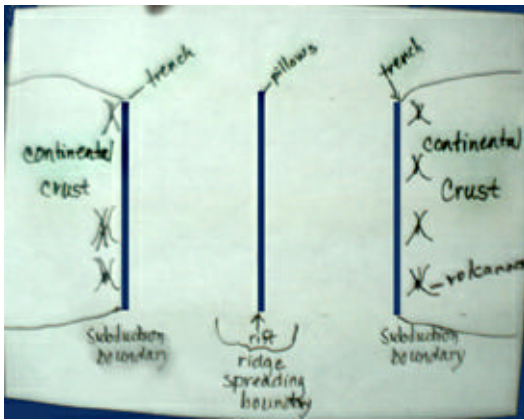


Be sure to wear goggles while using the iron filings and [follow all teacher directions](#).

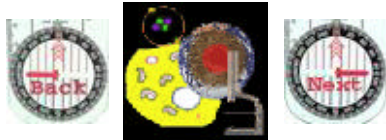
**Application:** How does this relate to the lines of magnetic reversal preserved in the rocks of the ocean floor and the rocks on land?

**Enrichment :** Use the same sheet of paper with the north and south orientations written on it to make the paper model of sea floor spreading.





Drag your mouse over the link to the 118KB [quicktime video to demonstrate this](#). This movie will open in a new window. **Close the window after you view the video.**



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